UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/989,880	11/21/2001	Stephen Ernest Jacobson	CH2804 US NA	1503

23906 7590 10/21/2003

E I DU PONT DE NEMOURS AND COMPANY
LEGAL PATENT RECORDS CENTER
BARLEY MILL PLAZA 25/1128
4417 LANCASTER PIKE
WILMINGTON, DE 19805

EXAMINER	
WILKINS III, HARRY D	
ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/989,880	JACOBSON ET AL.
	Examin r	Art Unit
	Harry D Wilkins, III	1742

-- Th MAILING DATE of this communication app ars on the cover she t with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 August 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The objections to the specification and claims have been withdrawn in view of Applicant's amendment.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-13, 23 and 24 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Angell et al (US 5,855,809).

Angell et al anticipate the invention as claimed. Angell et al teach (see col. 6, line 19 through col. 7, line 30) the deposition of an alkali metal (Li or Na) at the cathode [inherent based on the electrochemical reaction] by adding an electrolyte comprising a solution of $MAlCl_4$, where M is an alkali metal (i.e.-$MCl+AlCl_3$) mixed with a solution of equal parts of $AlCl_3$ and Cl_3PNSO_2Cl (trichlorophosphazosulfonyl chloride) (produced in example 2) to an electrolytic cell and carrying out electrolysis. Though Angell et al do not teach the product at the anode, based on the electrochemical reaction, the product would inherently be the halogen gas (such as Cl_2).

Regarding claims 2 and 3, in example 4, Angell et al teach carrying out the electrolysis at 100°C, which is above the melting point of Na. Thus, the process was

carried out under a condition that produced a molten layer of Na, but below a temperature of 200°C.

Regarding claim 4, Angell et al teach (see col. 4, lines 63-65) using aluminum chloride, boron chloride, antimony chloride or iron chloride.

Regarding claims 5-8, Angell et al teach (see col. 4) using several halogen-donating compounds that includes RSO_2X, where $R=CH_3$ (bottom left), as well as $RP(O)X_2$, where R= $-N=PX_3$ (upper left) and RSO_2X, where R= $-N=PX_3$ (upper right).

Regarding claim 9, Angell et al teach (see col. 4) each of these compounds.

Regarding claims 10-12, Angell et al teach (see col. 4) using $AlCl_3$ and each of these compounds.

Regarding claim 13, example 4 of Angell et al is carried out such that it is at a temperature of 100°C, which produces molten Na.

Regarding claim 23, example 4 of Angell et al includes electrolysis of NaCl with $AlCl_3$ and trichlorophosphazosulfonyl chloride at a temperature of 100°C.

Regarding claim 24, Angell et al teach in example 4 that Na is produced at the cathode (in the molten state at 100°C), and the basic electrolytic reaction would inherently produce Cl_2 gas at the anode.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 14-22 and 25-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Angell et al (US 5,855,809) and supported by Müller et al (US 4,740,279).

Angell et al teach a batch process for the electrolysis reaction.

However, it would have been obvious to one of ordinary skill in the art to have operated the batch electrolytic process of Angell et al as a continuous process by constantly adding more electrolyte and constantly removing the products (i.e.-molten Na and Cl_2 gas). It is within the level of ordinary skill to operate a process continuously. *In re Dilnot* 138 USPQ 248; *In re Korpi* 73 USPQ 229; *In re Lincoln* 53 USPQ 51. For an example of a conventional apparatus for carrying out the continuous electrolysis of a molten alkali metal salt to produce a molten alkali ~~salt~~ metal, see the disclosure of Müller et al.

Regarding claims 14, 25 and 32, Angell et al do not teach raising the temperature of the electrolysis reaction to higher that the temperature at which the alkali metal is molten. However, it would have been within the expected skill of a routineer in the art to have maintained the temperature of the electrolysis reaction in order to maintain the alkali metal in the molten state for easier continuous processing.

Regarding claim 15, all of the examples contained in Angell et al utilize Cl as the halogen.

Regarding claims 16-19, Angell et al teach (see col. 4) each of these compounds.

Regarding claims 20-22, Angell et al teach in example 4, using NaCl.

Regarding claim 26, Angell et al do not teach removing the molten layer of the sodium. However, it would have been obvious to one of ordinary skill in the art to have operated the batch electrolytic process of Angell et al as a continuous process, such as that disclosed by Müller et al, by constantly adding more electrolyte and constantly removing the products (i.e.-molten Na and Cl_2 gas). It is within the level of ordinary skill to operate a process continuously. *In re Dilnot* 138 USPQ 248; *In re Korpi* 73 USPQ 229; *In re Lincoln* 53 USPQ 51.

Regarding claim 27, Angell et al do not teach separating the molten metal to form a separated electrolyte. However, it would have been within the expected skill of a routineer in the art to have separated the molten metal from any electrolyte, such as by the means disclosed by Müller et al (4, 12, 13, 14, 15, 16, 16a, 17 and 19), to remove any impurities in the molten sodium in order to create a more pure product. This separation would inherently produce a recovered electrolyte as the electrolyte would be the only substance mixed with the molten metal.

Regarding claim 28, Angell et al do not teach recycling the recovered electrolyte. However, it would have been within the expected skill of a routineer in the art to have recycled the recovered electrolyte, such as in the manner described by Müller et al, in order to reduce costs by utilizing less input electrolyte and reducing waste disposal costs.

Regarding claims 29-31, Angell et al teach (see example 4 and col. 4) using NaCl, $AlCl_3$ and each of the three compounds and these would be the recovered electrolyte.

Response to Arguments

6. Applicant's arguments filed 19 August 2003 have been fully considered but they are not persuasive. Applicant argued that:

a. Angell et al do not teach an electrolysis process in an electrolysis cell; and,

b. It would not have been within the expected skill of a routineer in the art to have operated the electrolysis such that the produced alkali metal was in the molten state.

In response to Applicant's first argument, the Examiner is confused by Applicant's reading of Angell et al, particularly in view of claims 32-43 of Angell et al which include reference to an electrochemical device comprising the quasi-salt inorganic ionic liquid as an electrolyte. Though in the examples Angell et al describes using a voltammogram reaction and reversing the process, the principles of operation (applying a voltage across an anode and cathode to induce an electrochemical reaction) are identical. Angell et al merely used a different style of anode and cathode, one that could be switched in polarity to cause the opposite reaction to occur. That does not preclude the anticipation rejection because the formation of the alkali metal by an electrolysis reaction DID occur. Any container having an anode, cathode and electrolyte with a power source applied across the anode and cathode is an electrolytic cell. Thus, Angell et al teach adding the electrolyte to an electrolytic cell and carrying out electrolysis. Though not expressly disclosed by Angell et al, the anode product of the electrolysis reaction would by a halogen gas, e.g.-Cl_2. Support for this can be seen

in Müller et al (abstract and figure), where a solution of LiCl is electrolyzed from a molten salt electrolyte to produce molten Li metal and Cl_2 gas. Therefore, the electrolysis reaction of Angell et al inherently produces a halogen at the anode.

In response to Applicant's second argument, please see Müller et al, which describes to one of ordinary skill in the art how to operate a continuous electrolytic cell for producing and separating out a molten alkali metal. Müller et al supports the Examiner's conclusion that it would have been within the skill of a routineer in the art to have operated the electrolysis reaction in a continuous manner.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-Th 10:00am-8:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Harry D Wilkins, III
Examiner
Art Unit 1742

hdw

ROY KING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700